WHAT IS CLAIMED IS:

1. A magnetic body composed of non-magnetic material, comprising:

a plurality of localized electron regions in each of which at least one electron is confined to form a localized spin;

a barrier potential region having a higher energy than a Fermi energy of an electron in the localized electron region and confining electrons within the respective localized electron regions; and

a conductive electron region including a conductive electron system having a lower energy than an energy of the barrier potential region;

wherein the respective localized electron regions are disposed separate from one another via the barrier potential region and the conductive electron region to show ferromagnetism based on an interaction between localized spins through the conductive electron region.

2. The magnetic body according to claim 1, wherein the respective localized electron regions are formed by quantum dots.

3. The magnetic body according to claim 2, wherein the quantum dots are spatially arranged permitting a size fluctuation in a range that satisfies a condition in which a center-to-center distance between the nearest quantum dots is greater than a size of the quantum dot along a direction in which electrons are confined and at most $1/\pi$ times a Fermi wave length of a conductive electron of the conductive electron region.

4. The magnetic body according to claim 3, wherein the respective quantum dots are arranged in a three-dimension such that the Fermi wave length of the conductive electron is at most approximately 50 nm.

5. The magnetic body according to claim 3, wherein the respective quantum dots are arranged in a three-dimension such that the Fermi wave length of the conductive electron is at most approximately 4 nm whereby the magnetic body shows ferromagnetism at a room temperature.

6. The magnetic body according to claim 3, wherein the respective quantum

dots are arranged in a two-dimension such that the Fermi wave length of the conductive electron is at most approximately 300 nm.

7. The magnetic body according to claim 3, wherein the respective quantum dots are arranged in a two-dimension such that the Fermi wave length of the conductive electron is at most approximately 10 nm whereby the magnetic body shows ferromagnetism at a room temperature.

8. The magnetic body according to claim 3, wherein the respective quantum dots permit a size fluctuation in a range where the size of the quantum dot along the direction in which electrons are confined is less than $1/\pi$ times the Fermi wave length of the conductive electron.

9. The magnetic body according to claim 3, wherein the barrier potential region has a thickness less than a half of a length subtracting the size of the quantum dot, along the direction in which electrons are confined, from the center-to-center distance between the nearest quantum dots.

10. The magnetic body according to claim 1, wherein the respective localized electron regions and the barrier potential region are formed by an electrostatic potential in the two-dimensional conductive electron region at an interface between a semiconductor and an insulation layer when a given voltage is applied to an external gate electrode formed on the insulation layer.

11. The magnetic body according to claim 1, wherein the respective localized electron regions are formed by permitting electrons to be trapped in a quantum wire structure.

12. The magnetic body according to claim 1, wherein the localized electron region is composed of one of a semiconductor quantum dot, a semiconductor cluster, a carbon cluster and a metallic cluster.

13. A magnetic device comprising:

a magnetic body including a plurality of localized electron regions in each of which at least one electron is confined to form a localized spin, a barrier

potential region having a higher energy than a Fermi energy of an electron in the localized electron region and confining electrons within the respective localized electron regions, and a conductive electron region including a conductive electron system having a lower energy than an energy of the barrier potential region, wherein the respective localized electron regions are disposed separate from one another via the barrier potential region and the conductive electron region to show ferromagnetism based on an interaction between localized spins through the conductive electron region;

an insulation layer; and

a gate electrode disposed in close proximity to a conductive electron region of the magnetic body through the insulation layer;

wherein application of a voltage to the gate electrode allows a ferromagnetic condition of the magnetic body to be controllably turned on or turned off.

14. A method of manufacturing a magnetic body formed of non-magnetic material, the method comprising:

growing semiconductor material on a conductive electron region through a barrier potential layer in a self-organizing capability such that a center-to-center distance between the nearest quantum dots is at most $1/\pi$ times a Fermi wave length of a conductive electron.